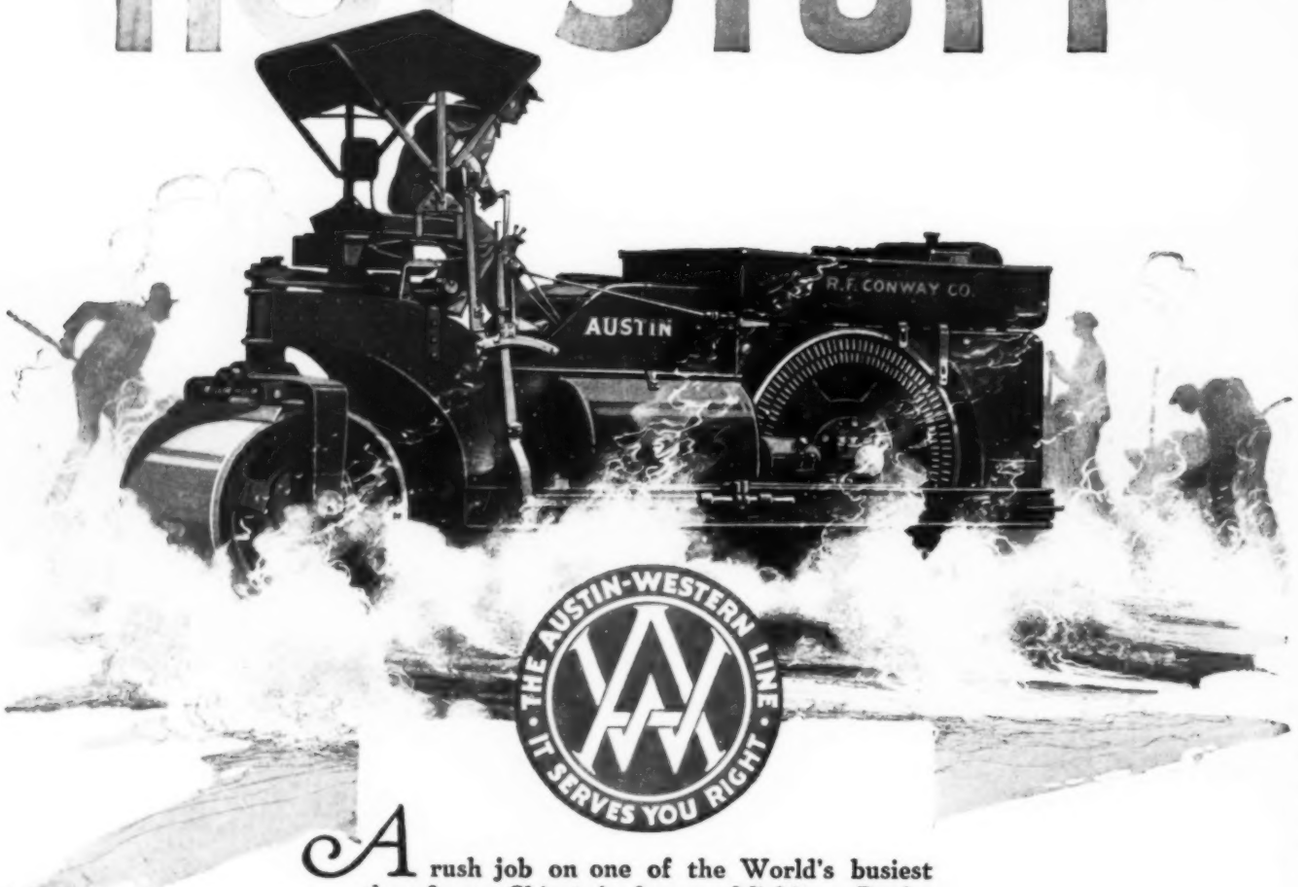
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

Vol 6 July 1924 No 7

"HOT STUFF"



A rush job on one of the World's busiest thorofares—Chicago's famous Michigan Boulevard—a job calling for work of the finest kind, done in the shortest possible time. The R. F. Conway Company landed it, and this Austin Motor Tandem Roller of theirs played no small part in completing it on schedule.

"Hot stuff" puts a tandem roller to the severest test, and that is where the motor driven Austin shines the brightest in comparison with those of the steam driven type. Check over a few of the features that have made Austins such lasting sources of satisfaction and profit to the Conway Company and many others among our more exacting paving contractors, and the answer is plain: No time lost getting up steam and taking on coal and water; no falling coals to injure the pavement; steadier running because of the low center of gravity; and easier steering and handling.

WHY TAKE LESS IN A TANDEM?

THE AUSTIN-WESTERN ROAD MACHINERY CO.

CHICAGO

Successful Methods

A Magazine of Construction Service

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The Tractor Has Arrived

THE tractor is being used on construction work to an extent that is little appreciated. Those whose experience goes back to the days of the old steam farm threshing engine on dirt-moving jobs are off the tractor idea for life. They are usually not ready to be shown. The modern gas tractor is, however, a horse of another color and type. It has been developed to a point of continuous serviceability under hard work that seemed improbable until recently. This largely accounts for the rapid spread in the use of tractors on all sorts of construction jobs.

The tractor will no more replace the horse entirely on construction work than it will on the farm. On the other hand, the tractor is being used much more extensively on small construction jobs than it is on small farms. In fact, it is not at all uncommon to see a tractor on a dirt-moving job of a couple of hundred yards or less. And on road maintenance work it is being used in place of horses on even the two-horse blade graders.

It is likely that tractors are being used in some cases where they are not the best tractive power for the job. On the whole, however, the extension of their use on construction work has been relatively slow and in the face of much serious prejudice against them. The gain in their employment thus appears to have been firmly established and evidently will grow rapidly in the next few years.

Road Maintenance Developments

AFTER traveling some thirty-five hundred miles in motor cars and buses on an inspection trip of all sorts of roads in eight states, one is more convincingly impressed with the good maintenance work that is being done on low-type roads. It is evident that there has been no sudden revolution in methods. The best ways of keeping roads in serviceable condition have instead been evolved slowly by experience and trial. They are thus well founded on bases that insure the best results for the money spent.

The hard maintenance problems are of course presented by medium to heavy traffic on low-type roads. As a result of methods that have been developed in recent years, such roads are being kept in good serviceable condition in several states at costs that are surprisingly low. In fact, up to the critical limit of the volume of traffic such roads can carry, the excellent condition in which low-type surfaces are maintained in these states is a great tribute to the officials in charge.

The upkeep of each road is, however, an individual problem. Indeed, a single mile will often present several distinct problems. There is, therefore, no general solution for all maintenance problems, nor even for any one type of surface. Two features do stand out, however, as indicating general application to all maintenance work. One of these is the necessity for constant attention. The other is the reduction of hand labor to an irreducible minimum by the use of machines.

Traveling along in a motor car at good speed the impression easily is gained that the maintenance units are close together and that the expense must be proportionately high. A study of the annual costs per mile shows, however, costs that are gratifyingly low. The answer is that the units are constantly on the move on the road and that each covers an astonishing amount of surface, thereby reducing the average cost with each mile of improved road.

The Outlook

THE construction industry of the country as a whole has not yet apparently felt the slump which has been so rapid in other industries. A recent visit to a dozen of the leading industrial and agricultural states shows a tremendous amount of building work under way. The surprising feature under present general conditions is the amount of new residences and small jobs that are just starting. There also was no evidence of any work having been shut down.

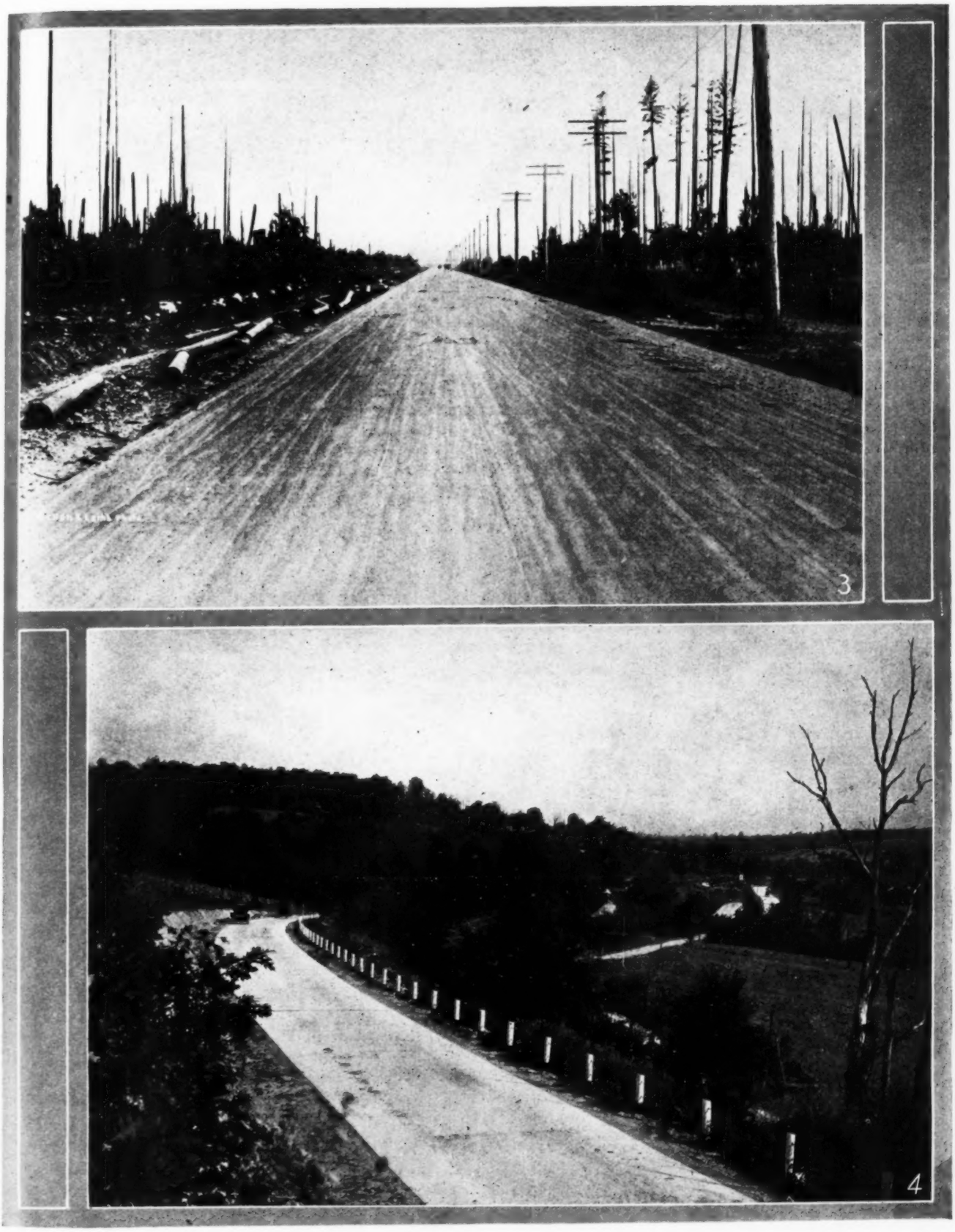
Highway work also is evidently going ahead apace. In fact an ample supply of labor, materials and railroad cars indicates that 1924 will be one of the biggest road building years, in spite of a backward spring. Moreover, the demand for more road improvement grows even faster than the almost unbelievable growth in the number of motor cars and trucks.

There is no need to fool ourselves, however, because general business must soon pick up or the construction industry will begin to ease off very appreciably. Road work and certain other public improvements will probably keep going, but residences and industrial improvements can be undertaken only when business is reasonably good or the outlook is for improvement. The next thirty days will very probably show what the last half of the year is going to be for the construction industry.

The Old Road

1. A road through the lumber country in British Columbia, as it was. © *Keystone.*
2. A Pennsylvania highway as it looked when reconstruction began. © *Keystone.*

And the New



3. As the road in British Columbia is now. © *Keystone.*
4. When the Pennsylvania job was done. © *Keystone.*

AN UNUSUAL USE FOR POWER SHOVELS

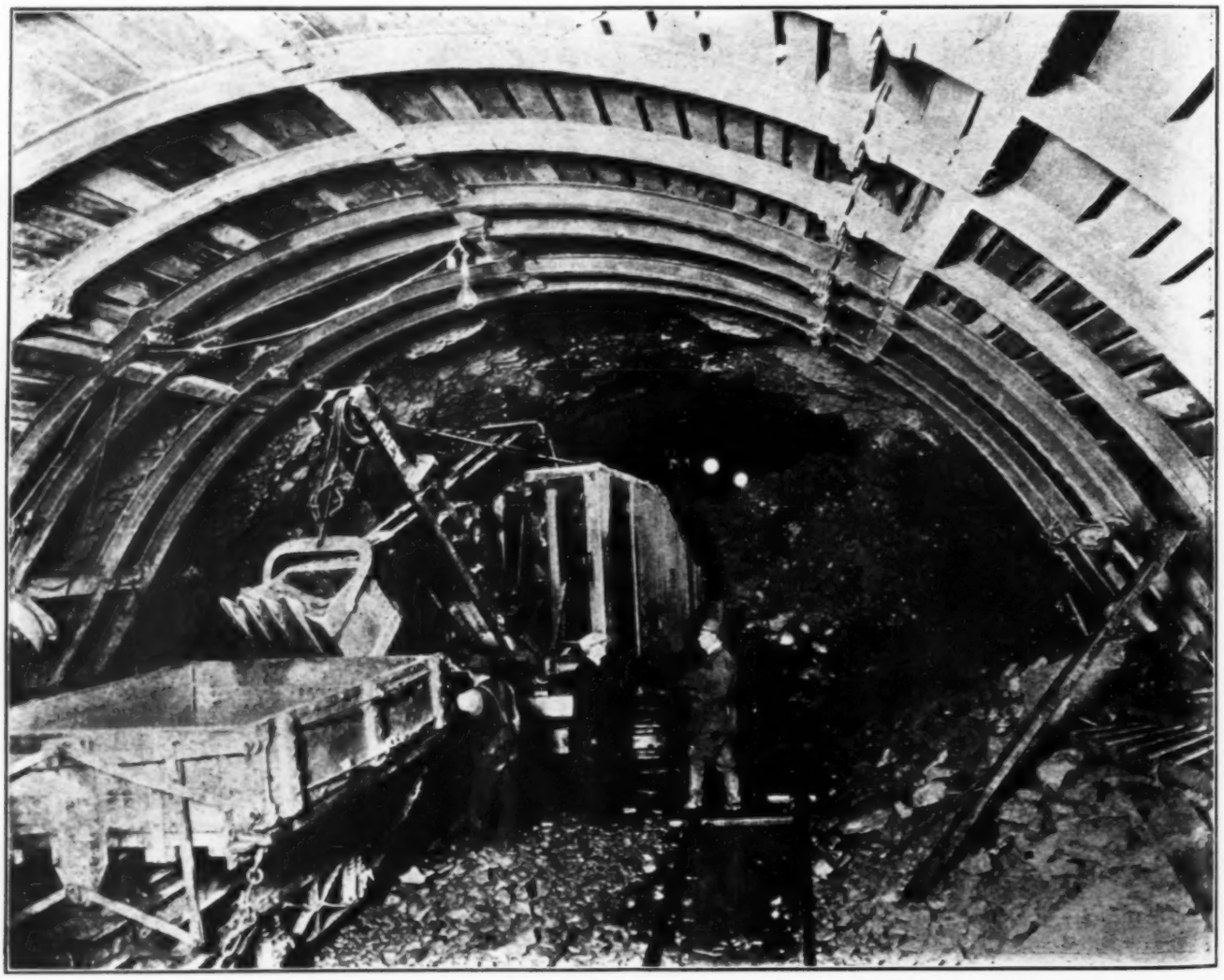
Niagara Power Company Finds Them Valuable Aids in Cutting a 4300-Foot Tunnel Through Solid Rock

THE versatility of power shovels in development work has never been fully recognized, but they are rapidly coming into their own, as new uses are being demonstrated constantly. Every year contractors and engineers discover new ways in which they can be utilized to advantage.

The mammoth power tunnel project put through by the Niagara Power Company of Niagara Falls demonstrated an unusual use for steam shovels that should be of interest to every engineer and contractor. They wished to cut a tunnel 36 ft. in diameter (almost ⅞ of a mile) through solid rock, approximately 4300 ft. long and 140 ft. beneath the city of Niagara Falls. The purpose was to take water from the upper river above the city and carry it by means of this tunnel to their power plant below the falls, where it was required to run three 70,000 hp. turbines for the generation of electric power. The rock formation through which this tunnel was to pass was practically solid Medina limestone. In fact, very little shale was encountered throughout the entire length of the tunnel.

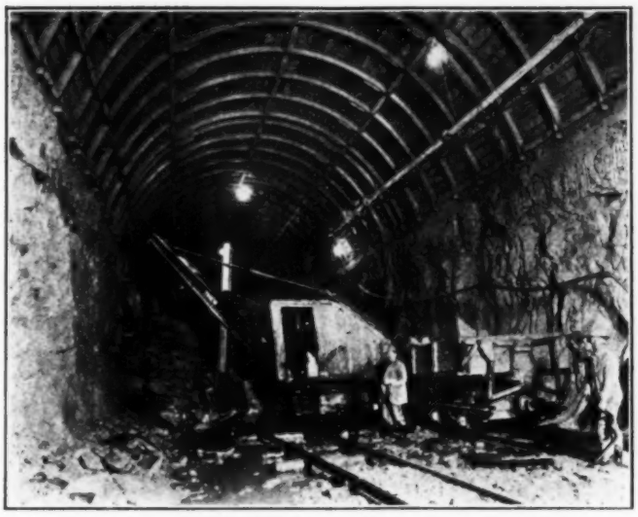
The Read-Coddington Company, who contracted to handle this project, demonstrated what brains, confidence and the proper equipment can do. The plan of operation was interesting and unusual. It is probably the first time in development history that steam shovels were used for the entire clean-up in tunnel work, and the first time a solid rock tunnel was ever bored without either hand or machine mucking or hand shoveling. It speaks well for the intelligent planning of the project and the proper selection of equipment that their original plans went through without a hitch from start to finish. One very noticeable thing about this job was the excellent organization of the men and their individual interest in the success of the project. This loyalty speaks well for Read-Coddington's treatment of their workers.

Preliminary to the main tunnel work two vertical shafts were sunk to a depth of 140 ft., one about 950 ft. from the proposed intake end and the other



SHOVELS MEETING AT THE HEADING. NOTE THE SPECIAL CAB BUILT TO PROTECT THE OPERATOR

about 1500 ft. from the outlet forebay. The object was to bore the tunnel at five points simultaneously; that is, two ways from each shaft and from the outlet end. It required about three months to sink these vertical shafts and get ready for the actual tunnel work.



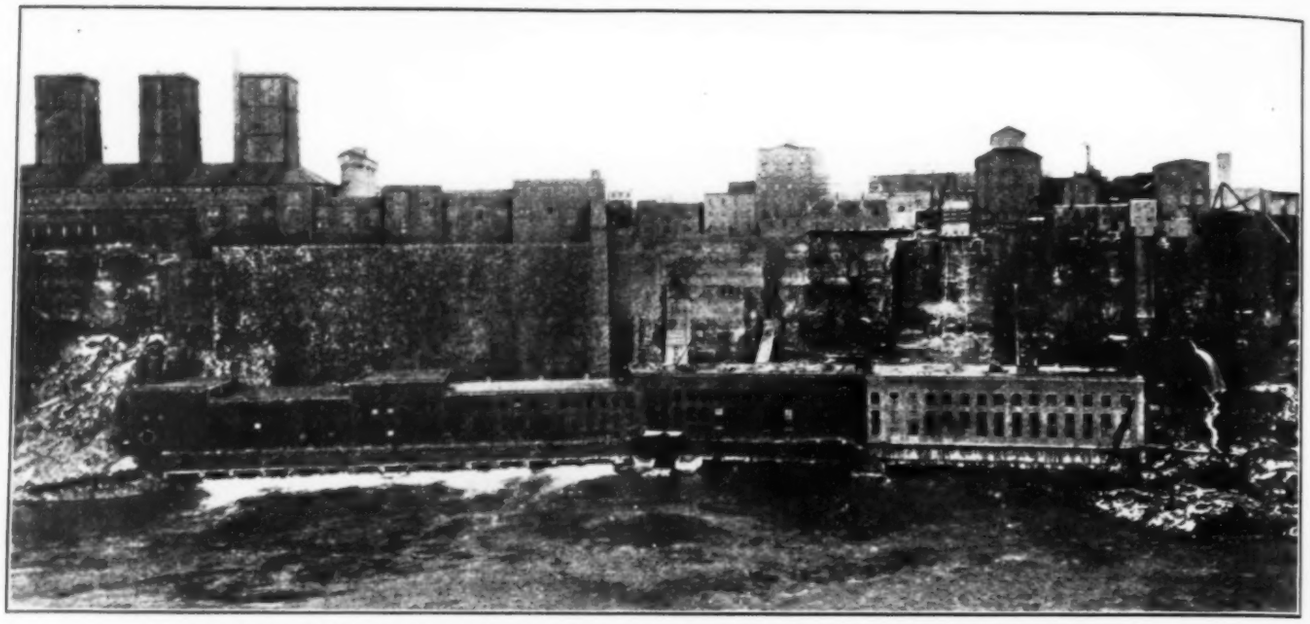
REMOVING THE RESULTS OF A DAY'S SHOOTING

In the meantime five steam shovels were specially prepared for the removal of the rock as it was blasted loose. The cabs were removed and short booms and dipper sticks installed to enable the shovel to operate in low head room. Low, sloping special cabs were built to protect the operator from possible falling of small portions of overhead rock. The boilers were also removed, the intention being to operate the shovels by the 90-lb. air pressure line which was also to operate the rock drills. The drilling and shooting was done in the daytime and the rock removed at night by the shovels, one in each drift.

The heading was first cut the entire length and arched with steel forms and dry packed above the forms with concrete. The rest of the tunnel was cut in three benches. The advance was at the average rate of 9 lin. ft. per day in the heading and 7 ft. per day on the bench work. The rock was loaded by the shovels into 4-yd. cars hauled by electric mine locomotives to the two shafts, where the rock was hoisted by electric bucket hoists to the ground level. Practically all of the rock was shoveled up and loaded into the cars by the power shovels without the need of hand shoveling throughout the project.

The daily record sheet of the Read-Coddington

THE CLEAN-UP IN THE BIG CANAL AFTER THE TUNNEL WAS COMPLETED



THE NIAGARA POWER COMPANY'S PLANT SHOWING NEW SECTION AT THE EXTREME RIGHT

Company shows that the advance was practically mathematical in its uniformity from start to finish. Records show that the shovels worked like clock work throughout, and only one day was lost on one drift due to shovel trouble in the entire two years required to complete the bore.

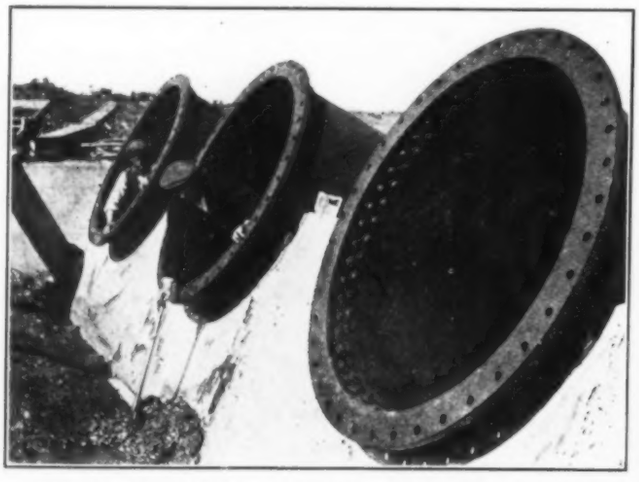
After the tunnel was completed the entire tunnel was smoothly cemented, but no shoring or supports were required the entire length because of the solid rock formation.

The water flows through this tunnel at a rate of 12 ft. per second at the outlet end, a total volume of 10,000 foot seconds. The tunnel was completed in 1923.

After the underground tunnel was completed the shovels were taken out, restored to their original condition and used to help clear out the company's canal which had been their original source of water supply, and which will be used in conjunction with the tunnel in the future. From June 13, 1923, to the end of Sept., 1923, 85,000 cu. yd. of rock was removed from the canal floor and walls.

INCREASING LONDON'S WATER SUPPLY

THE photograph on the cover of this issue of SUCCESSFUL METHODS shows one phase of the work being done on an enormous reservoir being built to add to London's water supply. This reservoir is to hold 6,750,000,000 gal., and the embankment shown in the cover photograph is nearly seven miles around. In order to provide a site for this reservoir a part of the village of Littleton in Middlesex had to be demolished.



THESE PIPES WILL FILL THE GREAT RESERVOIR

In the cover photograph the men are levelling the surface of the concrete embankment. In the two photographs on this page are shown the inlet pipes which will fill the great reservoir with water from the Thames River. In photograph on the right-hand side the men are inspecting the inlet pipes with hammers.

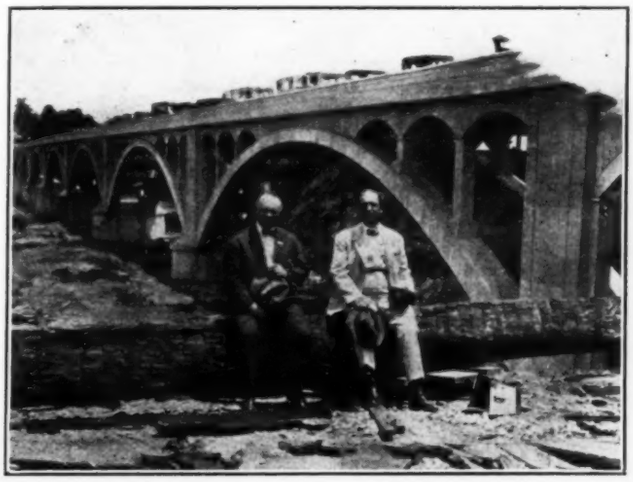
INSPECTING THE INLET PIPES WITH HAMMERS

PAN-AMERICAN HIGHWAY COMMISSION ENDS ITS TOUR

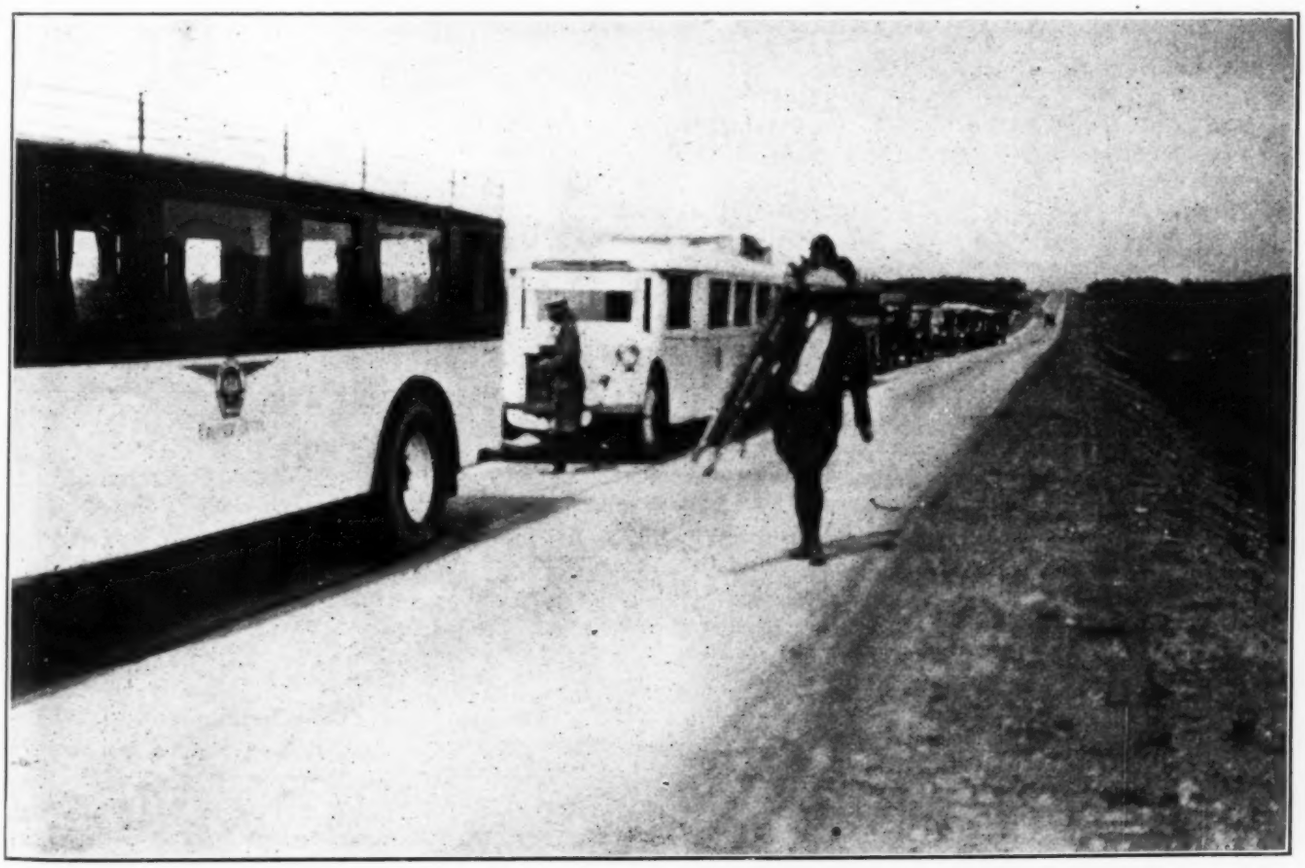
Real Work of Delegates Has Just Begun. They Will Be Pioneers in Road Development in Their Own Country

THE Pan-American Highway Commission will complete its intensive study of roads of the United States about the time this issue of SUCCESSFUL METHODS comes into the hands of its readers. One solid month has been spent in a tour of study and inspection by this group of distinguished visitors from the Central and South American republics. In that time they have visited the States of North Carolina, Kentucky, Ohio, Illinois, Minnesota, Wisconsin, Michigan, New York, Pennsylvania and New Jersey. They have had an unequalled opportunity to see and to study the art of road building as practised in this country. Every type of road has been shown to them,

PAN-AMERICAN COMMISSION READY TO SEE THE MAHONING IRON MINE IN MINNESOTA



THOS. H. MAC DONALD, CHIEF OF THE U. S. BUREAU OF PUBLIC ROADS, AND M. R. BALINA OF ARGENTINA, WITH THE YADKIN RIVER BRIDGE IN THE BACKGROUND



BIG BUSES WERE USED IN MINNESOTA AND NORTH CAROLINA

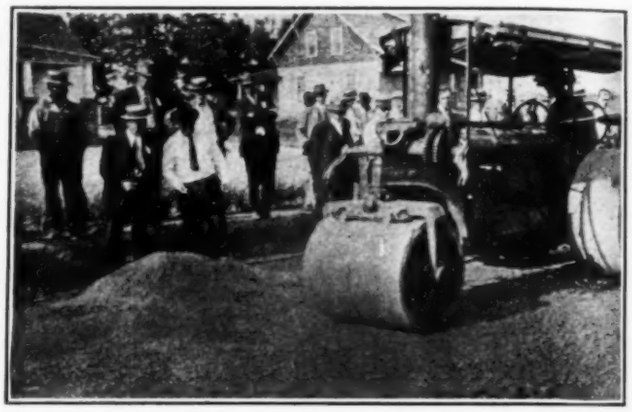
its merits and developments both explained by competent authorities, and every possible effort has been made to acquaint them with the problems of highway construction.

ONE OF THE DELEGATES DRIVING A TRACTOR AT GREENSBORO, N. C.

But the real work of the Commission has just begun. The members of the group are about to return to their own countries where the knowledge obtained on the trip may be put to good use. The greatest use to which this knowledge can be put is in the avoidance of the mistakes made during the phenomenal boom in highway construction in the United States during the last few years. South America can profit by the mistakes made here, and there is every evidence that she is going to do so.

The members of the Pan-American Highway Commission have been royally welcomed wherever they have been. Each community has done its level best to outdo its neighbors in cordiality. The result is that the delegates who form the Commission have learned as much, or more, about the people who use the roads of the United States as they have about the roads themselves.

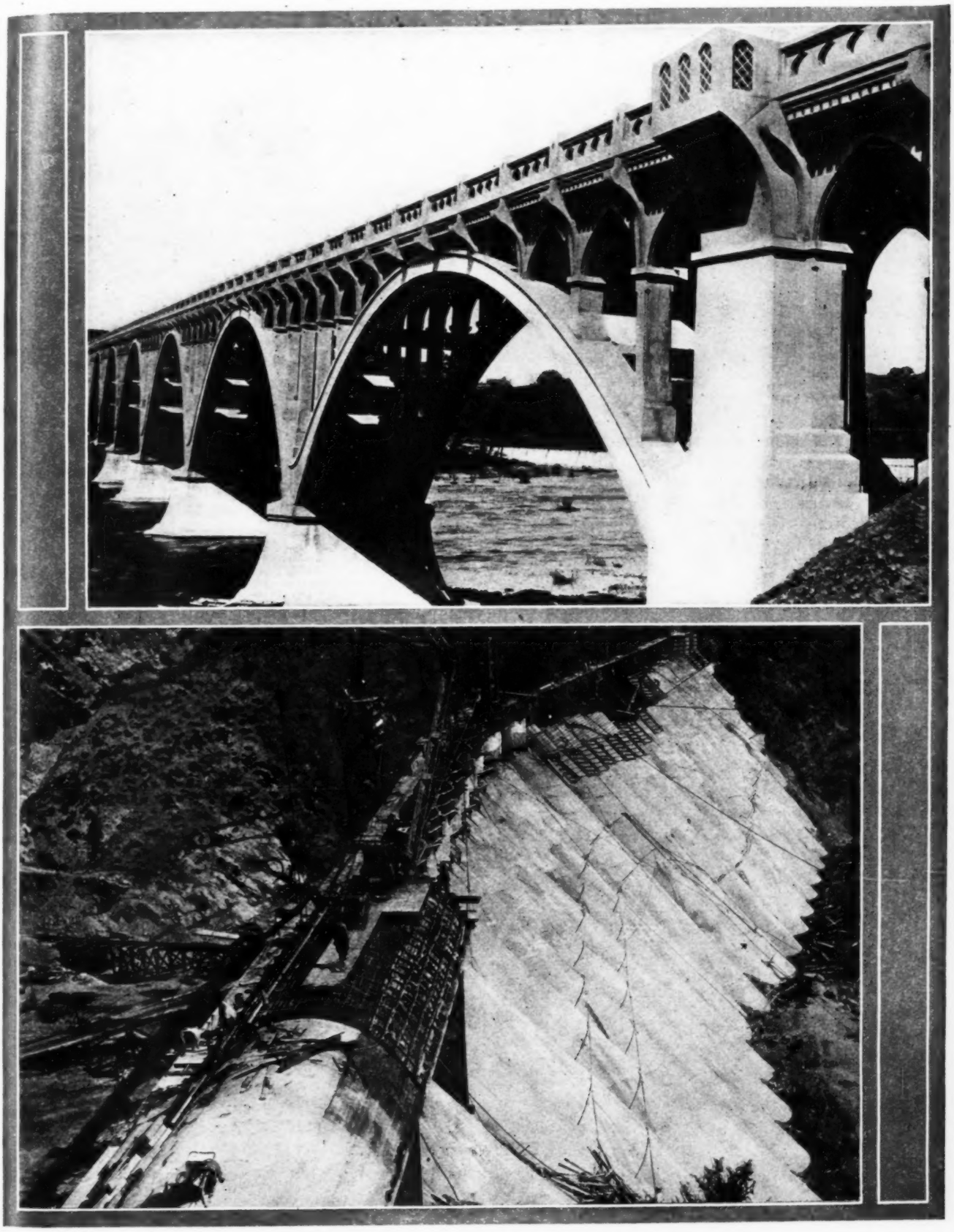
The trip began with a two-day session in Washington, during which the delegates met President Coolidge, Secretaries Hughes, Hoover, Wallace and Davis and other men of prominence in public life. They visited Mount Vernon and the tomb of Washington, and later on while in Illinois went to the tomb of Lincoln. Their inspection of the roads of the country was made in touring cars and buses.



SENORES CUELLAR OF MEXICO AND PADILLA OF GUATEMALA STUDY A SMALL ROLLER'S WORK

TOURING CARS CARRIED THE PARTY IN WISCONSIN AND ILLINOIS

Working Wonders with Concrete



Above—A new concrete bridge at Winchester, Ore., on the Pacific Highway © *P & A Photos.*
Below—The highest multiple arch dam is nearing completion in the San Gabriel mountains of California
© *P & A Photos.*

MAINTAINING THE HAULING SCHEDULE

Illinois Contractors Make Best Producing Record by Use of Industrial Railway for Transporting Materials

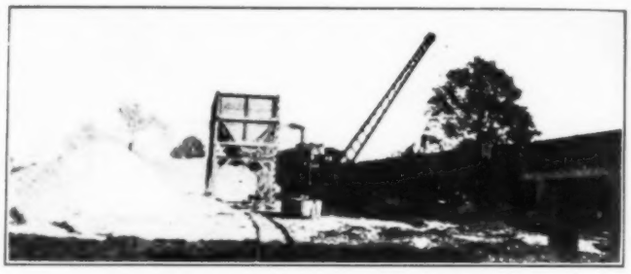
By C. P. BURTON

DURING the year 1923, Illinois headed the list of States in the mileage of hard surface roads constructed during that year, having completed up to December 6 a total of 1072.67 miles. Of this mileage 1024.66 miles are of cement concrete or equivalent construction. Such roads were laid during the season at the rate of 30 to 50 miles per week, and one contractor succeeded in pouring 2018 ft. of 18-ft. cement concrete with one mixer in one working day.

LAYING CONCRETE PAVEMENT

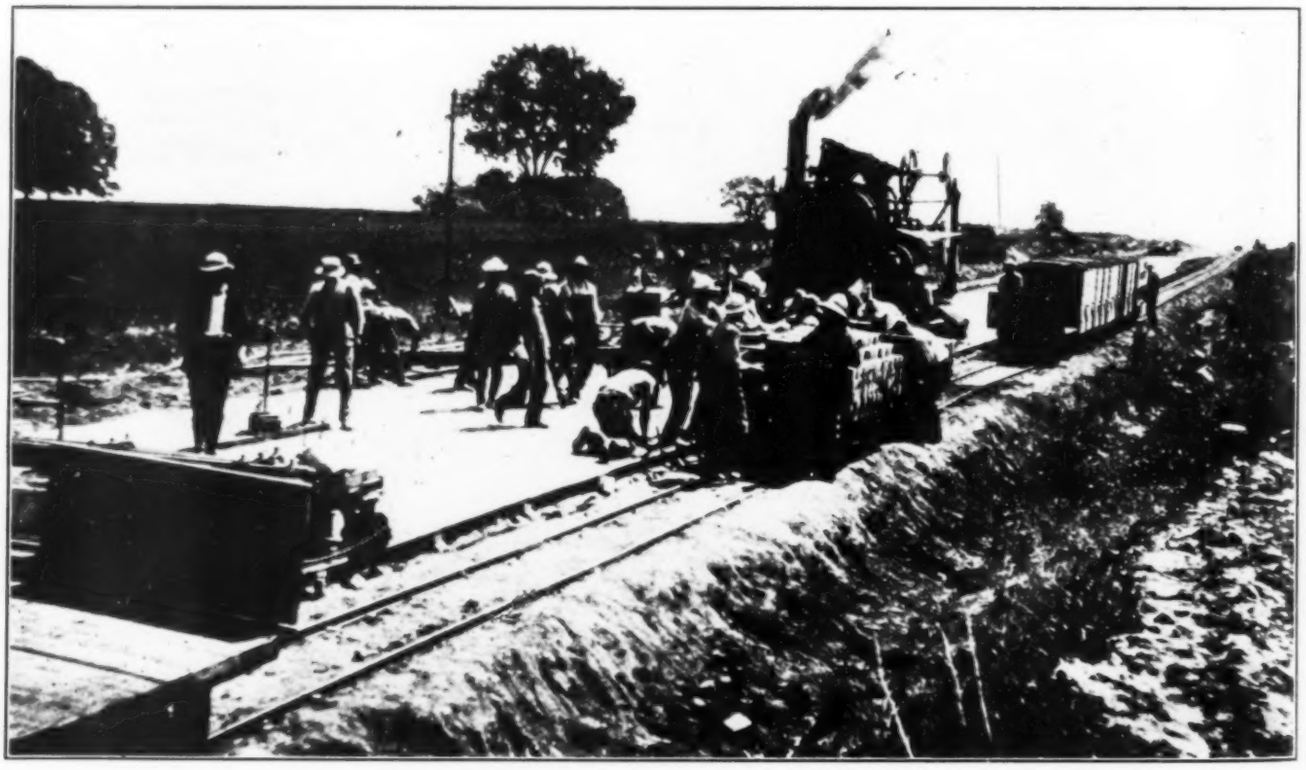
Illinois entered the year 1924 with 647.10 miles of work under contract and the completion of this work is now in full swing. It is hoped that another 1000 miles of pavement will have been completed before the end of the present year.

When a State like Illinois is building concrete roads at the rate of 1000 miles a year, it is a fair assumption that road builders everywhere can learn something from a study of the methods used in attaining such notable results. In explaining this record, Frank T. Sheets, Illinois State Superintendent of Highways, says "much credit for this achievement is due the road contractors who have taken Illinois road work. They have developed construction methods and have attained an efficiency of operation undreamed of a few years ago."

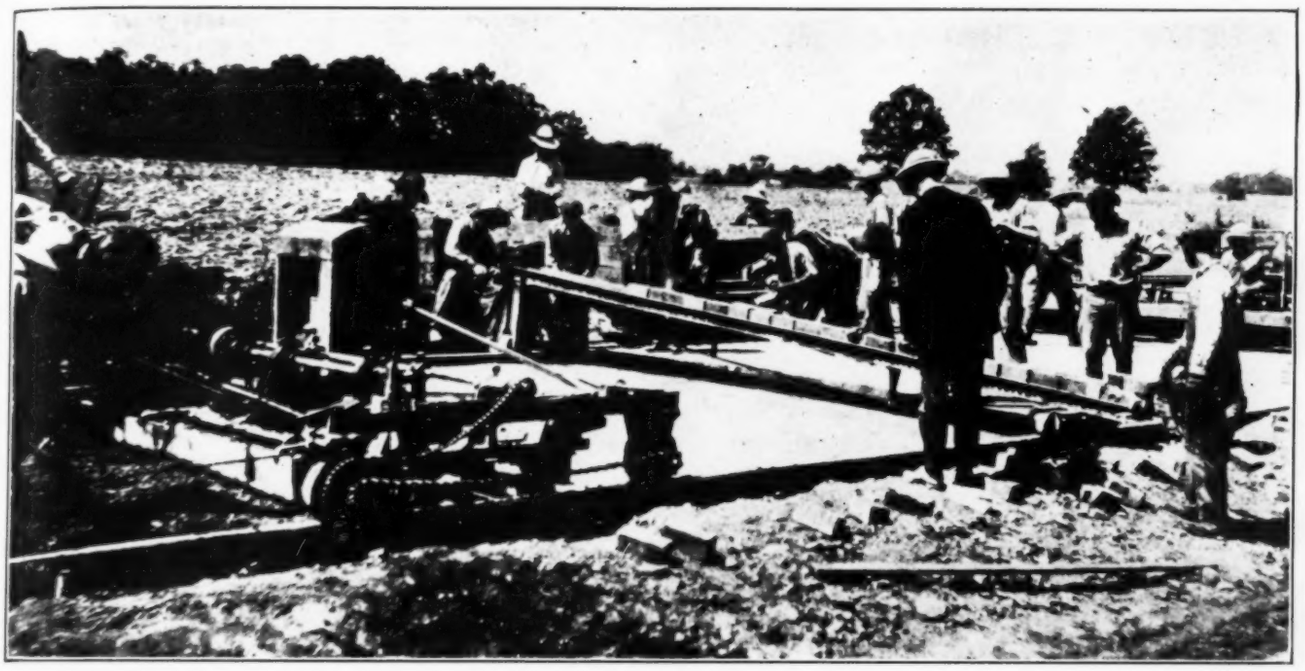


MATERIAL BINS AND STOCK PILES

While this is true, the great mileage was made possible through the Illinois Highway Department's policy of letting contracts in the fall, followed by extensive storing of materials in the early spring months. Under this plan the enormous task of pro-



METHOD OF HANDLING CONCRETE AND BRICK



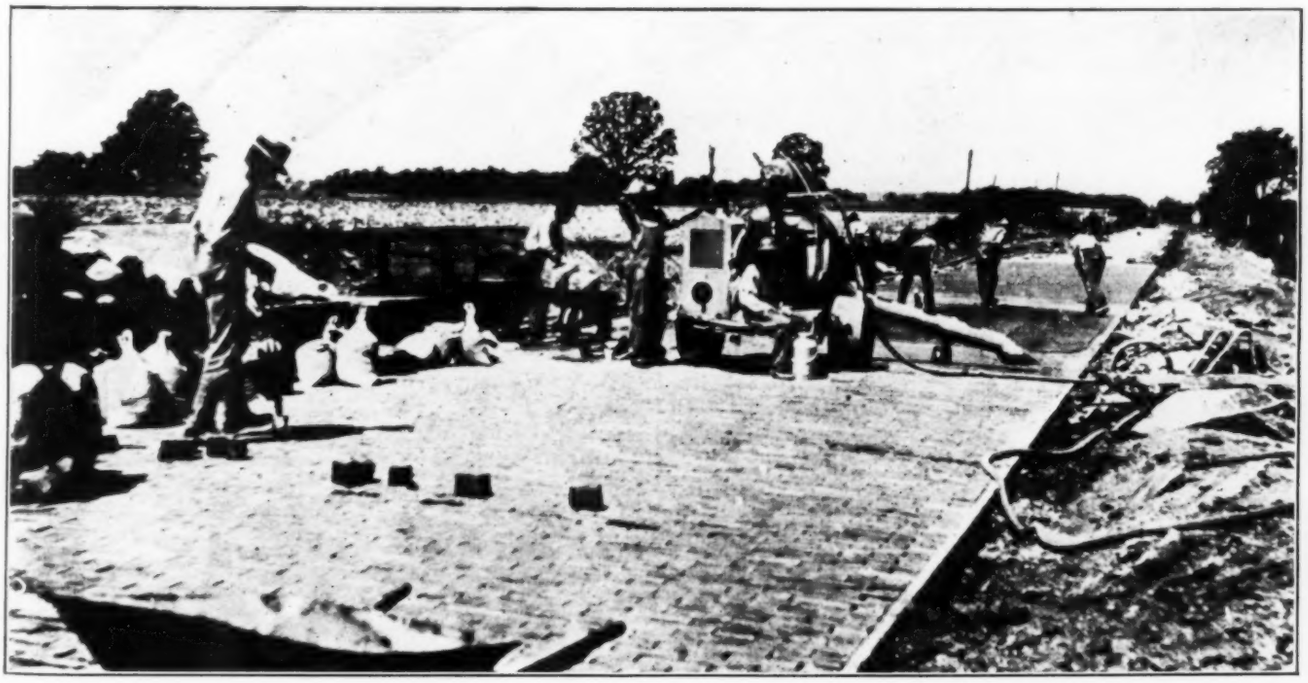
BRICK PAVING—ONE FINISHING MACHINE IS WORKING ON THE CONCRETE BASE; THE OTHER TAMPING BRICK

ducing and transporting materials has been spread over the larger portion of the year, instead of being crammed into a brief space of four months, as formerly was the custom.

It is worth while noting in this connection that the best producing records made last season in Illinois were made by those contractors who used the industrial haulage system for transporting dry batches from a central proportioning plant to the mixer over 24-in. gage railway, and that this has become the standard method of construction in the State. One of last year's contracts, which is now being completed, is for the construction of 21½ miles of hard road from Mt. Carmel, Illinois, to a point 4½ miles west of Albion. The contract was let to a Paris, Illinois, firm, known as Alan Jay Parrish, consisting of Mr. Parrish and Rodney L. Bell, his superintendent of construction.

The outstanding features of this work are the heavy grades and the method of hauling. The first 4½ miles was over extremely hilly country. Not even 100 consecutive feet of level grading was done on the entire strip. The maximum grade was 5 per cent and there were several grades of 4 per cent. This part of the pavement was of brick construction.

The problem was largely one of transportation: to



LAYING THE BRICK. THE CARS LOADED WITH MATERIAL MAY BE SEEN AT THE LEFT

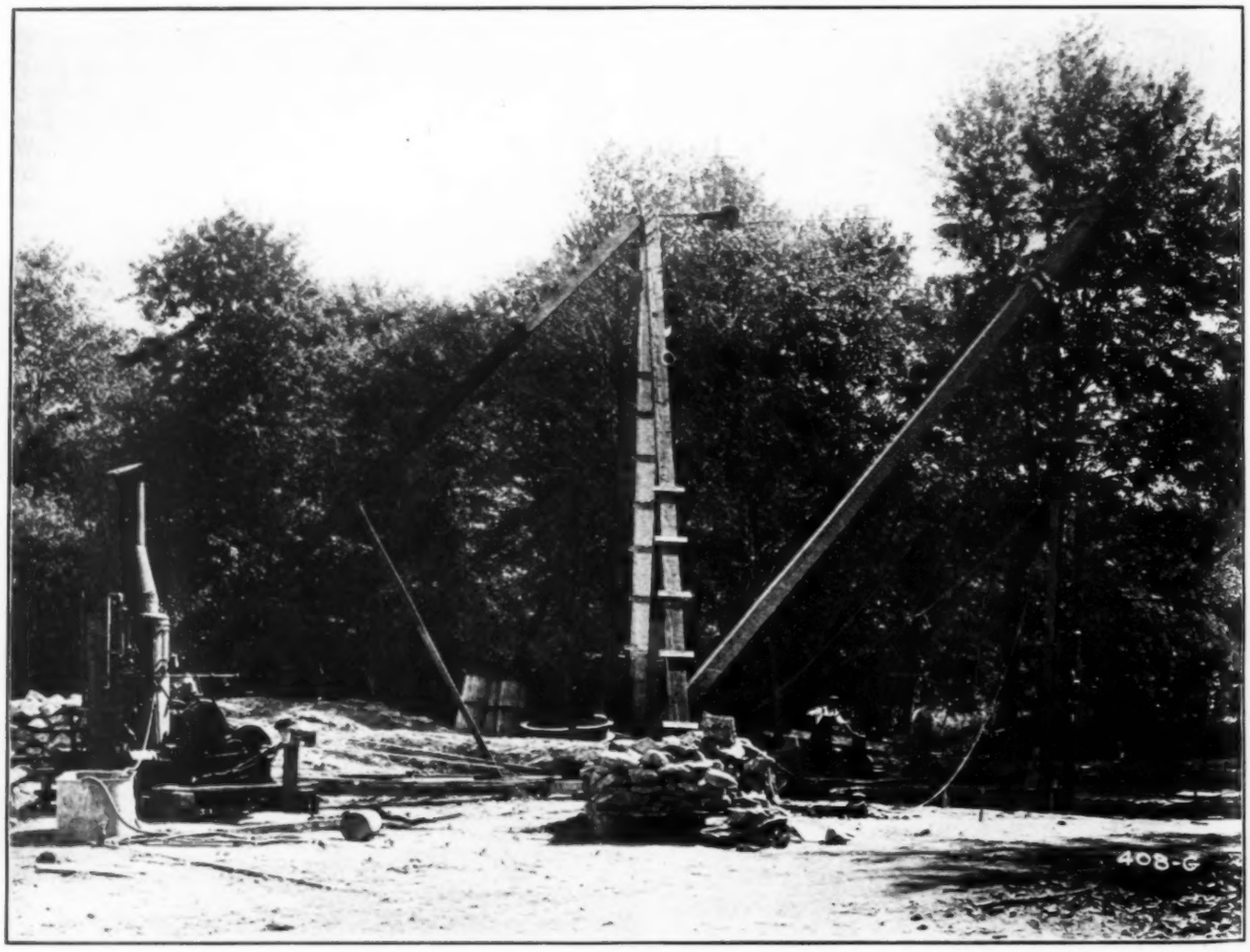
maintain the hauling schedule and keep materials at the big mixer. This problem was made more difficult because of the heavy grades. The contractors were afraid to trust to motor truck transportation on the clay hills of southern Illinois and they decided that the use of batch boxes hauled on a narrow-gage railway, laid along the shoulder of the road, would be the correct installation.

The most interesting part of this contract has been the brick paving, which requires cement, sand and gravel for the base and special sand and gravel for the grout filler, as well as brick for the surfacing. The contractors carried on all operations at the same time, keeping the finished pavement as close to the mixer as possible. The brick surface was laid and grouted to within 100 ft. of the mixer, which was occupied with mixing and pouring the base.

Batch boxes on cars, operating on industrial track, were used in the ordinary way for hauling the aggregate and the grouting material. For hauling brick, the heavy duty cars, specially designed for carrying batch boxes, were equipped with home-made platforms and each made capable of hauling about five tons. Material was hauled in trains of eight cars each. Three cars were loaded with brick and five cars with concrete aggregate and cement. When a train of this character arrived at the mixing machine, the three cars of brick were pushed back to where the brick could be handled during the period required for unloading ten 5-bag batches from the remaining cars into the mixer, an average of about fifteen minutes.

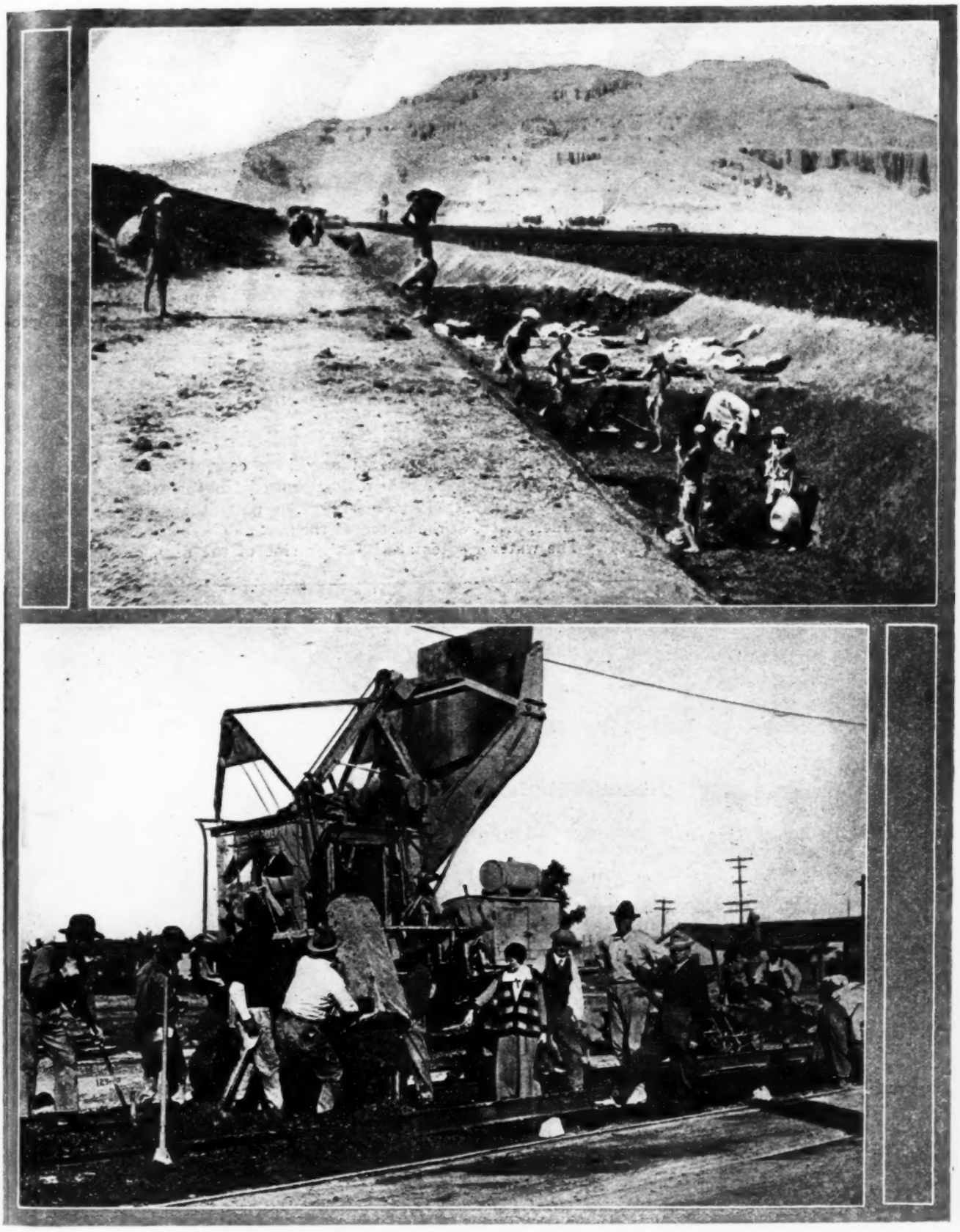
A VERSATILE DERRICK

THE versatility of the derrick has been illustrated by the Herrick Construction Company of Carrollton, Ill. As shown in the accompanying photograph, a stiff leg timber derrick operated by a two-drum steam hoist was used to support the leads on a pile-driving job. The leads were suspended from the boom end and the hammer was raised by the same hoist that operated the derrick. By raising, lowering, or swinging the boom, considerable territory was covered without making it necessary to move the derrick. In this manner the trouble of moving the lead tower for each individual pile, as on ordinary operations, was eliminated, with a consequent lessening of time and expense.



HOW THE DERRICK HANDLES THE JOB

A Contrast in Methods

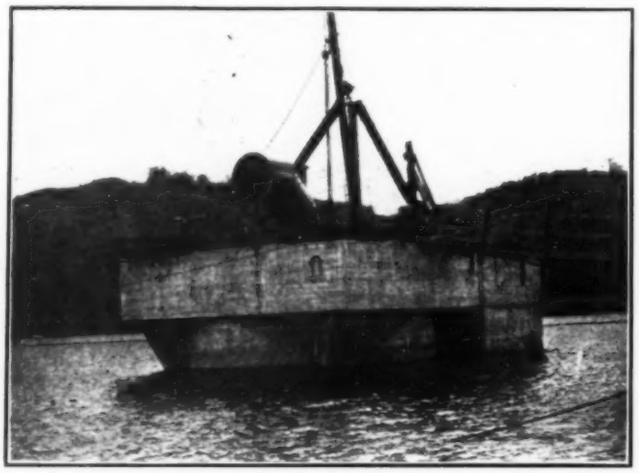


Above—In Egypt they still do things in the primitive way they were done in the time of the Pharaohs © *Keystone.*
Below—Here in the United States we find a woman directing a big road job on which modern machinery does the hard work © *P & A Photos.*

LARGEST EARTH FILLED DAM COMPLETED

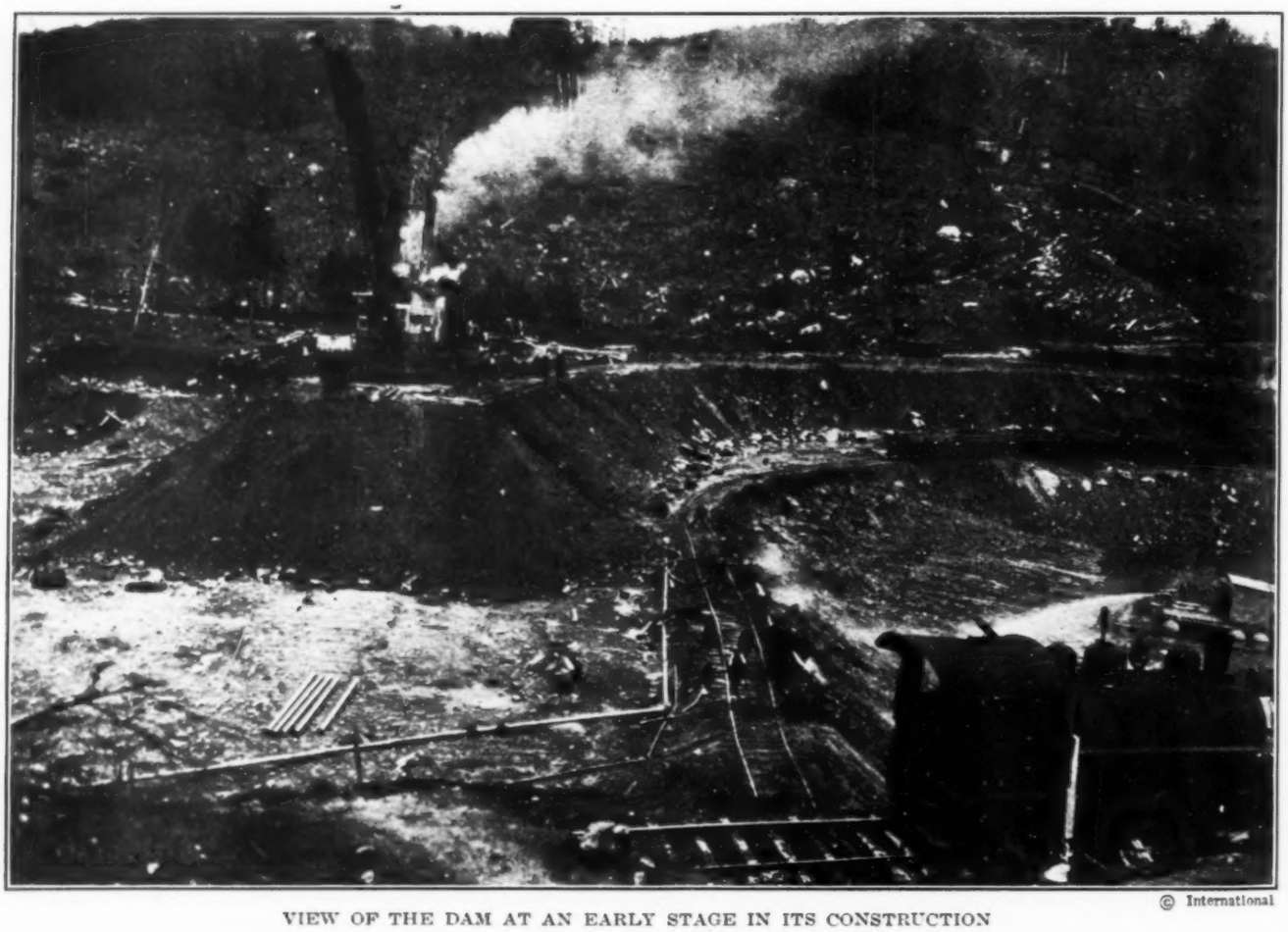
New England Power Company Will Supply Many States from $10,000,000 Electric Plant in Vermont

THE New England Power Company has recently opened for operation at Whitingham, Vt., what is probably the largest earth-filled dam in the United States. At the present time two large generators will supply 40,000 hp. and a third generator to be installed within the next few months will add 20,000 hp. to the facilities of the plant. This plant will supply nearly all of the New England States with electricity.



CONCRETE SHAFT WITH MOTORS CONTROLLING GATES TO PENSTOCK

The dam which was built across the Deerfield River completely fills the valley at Whitingham. It is 1500 ft. long and 200 ft. deep. The man-made lake back of the dam is 12 miles long and is deep enough to float an ocean liner. At the dam the depth of the water is 185 ft. The water submerged several farms, the main highway and the railroad tracks in the vicinity. The tracks now run across the top of the dam and the main highway has been diverted to the side of the hill joining the road below the dam. A unique spillway shaped like an inverted cone takes care of the excess water and prevents any overflow. At the present time there is considerable overflow due to the spring freshets and the heavy rains of the last few weeks. Near the spillway is a cement tunnel shaft which houses the motors that control the gates near the dam. This shaft is 120 ft. deep and the motors are installed at the bottom of the shaft. There are motor controlled gates at the other side of the dam, one-half way to



© International

VIEW OF THE DAM AT AN EARLY STAGE IN ITS CONSTRUCTION

THE UNIQUE SPILLWAY SHAPED LIKE AN INVERTED CONE WHICH TAKES CARE OF THE EXCESS WATER

the power house and at the power house. A huge tunnel leads from the base of the dam to the power house below, a distance of 5 miles down the valley. The two generators now working are supplying a 110,000-volt line of electrical power which goes to Millbury, Mass., where it joins other power lines of the New England Power Company.

As said before, the dam is entirely earth filled, no cement having been used. The hydraulic fill method was used. The parallel embankments of earth were filled across the valley and then filled in between. The earth on the location is of clay texture. The pressure tunnel is lined with concrete and is 5 miles in length from dam to power house. This tunnel had to be carried through a mountain just as was done in the case of the Hoosac tunnel in the Berkshires and this piece of work took considerable time and held up the completion of the work.

The work was completed in two years and the cost of the dam was approximately $10,000,000. In the December, 1923, issue of SUCCESSFUL METHODS will be found a description of the early stages of the work and a photograph of the conical shaped spillway before the water was allowed to flow over it.

The dam has been visited by thousands of New England residents and over the week end the traffic is so dense that two traffic policemen are required to be on the job all the time.

TEARING UP OLD PAVEMENT

THE inventive genius of a San Franciscan has saved the Market Street Railway Company many thousands of dollars in reconstructing its lines on Market Street. W. D. Chamberlain, one of the assistant engineers of the company, devised a machine called a "gilette," which slices off the old macadam in great chunks on streets to be torn up. Formerly it took five laborers considerable time to tear up a block of pavement between the two street car tracks, but now the "gilette" does the same work in 10 minutes. For example, the machine attached to a flat car tore up a strip between the tracks on Market Street from Stockton to Power, a distance of one block, in 8 minutes. The machine is built like a flat-bottomed trough with steel teeth on the end of which is inserted under the pavement. The other end is attached to a flat car which furnishes the power for pushing the teeth under the pavement.

A VIEW OF THE MACHINE AT WORK

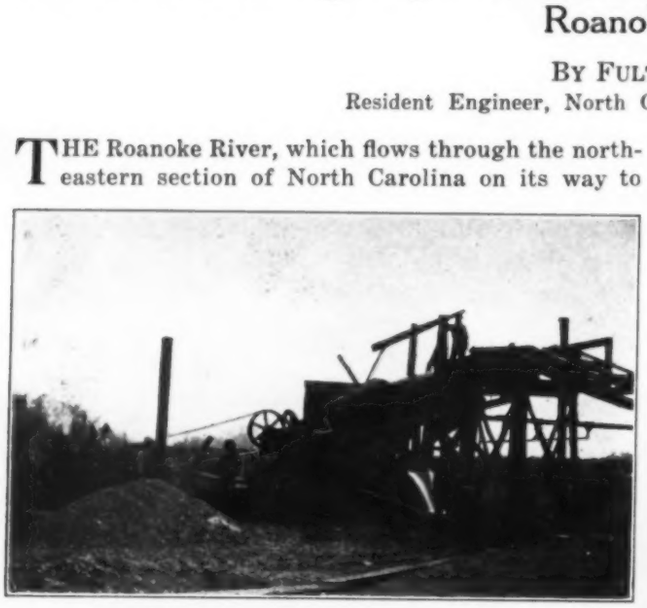
THE EDWARDS FERRY CAUSEWAY

North Carolina Highway Commission Is Building $350,000 Bridge Across the Roanoke River

By Fulton Pace
Resident Engineer, North Carolina Highway Commission

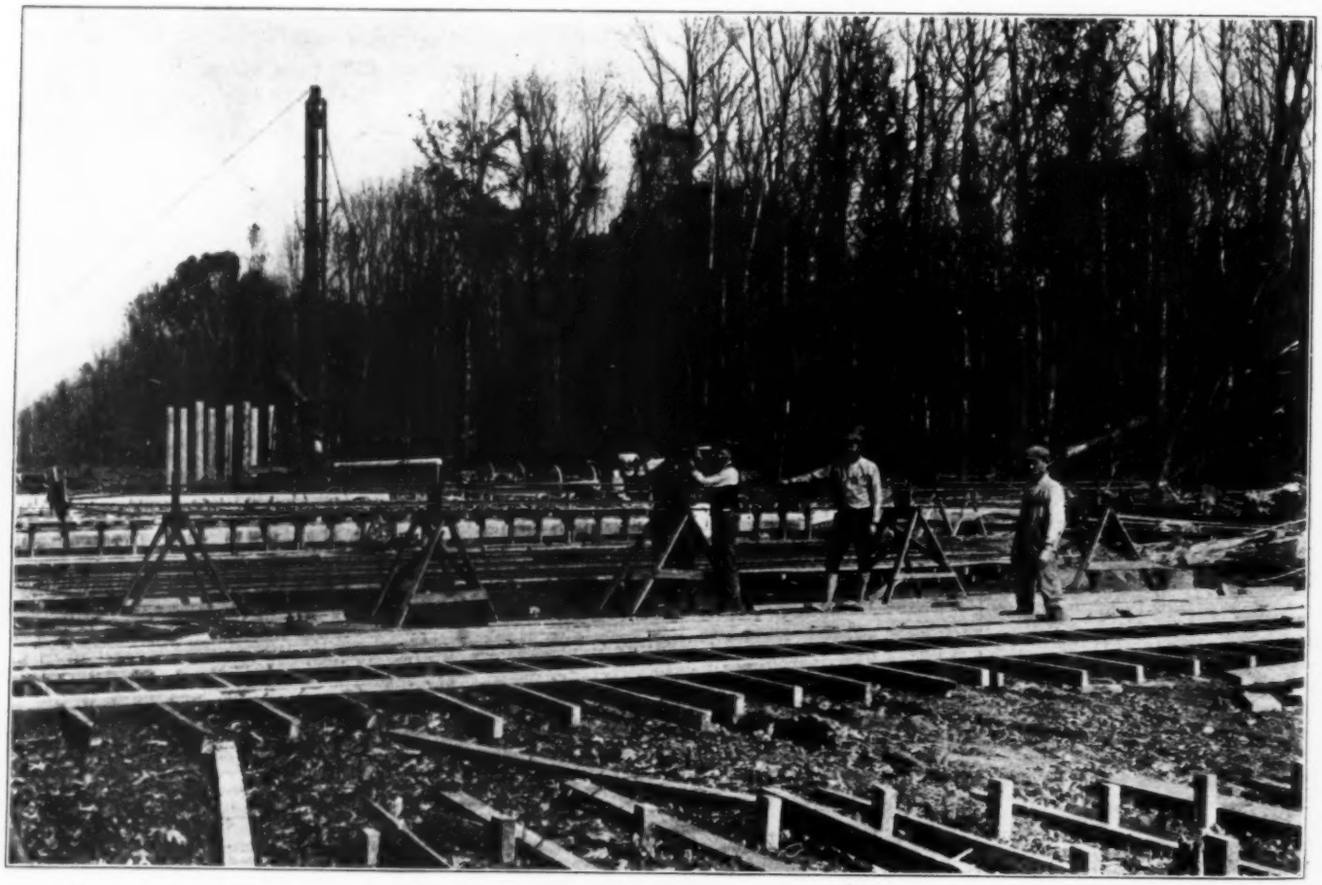
THE Roanoke River, which flows through the northeastern section of North Carolina on its way to the Atlantic Ocean, completely cuts off from the rest of the State the counties lying along its east bank. In order to remedy this situation and establish easy communication not only between the various counties bordering on the river, but also to provide a short route from western points in the State to Virginia cities and towns, the North Carolina State Highway Commission decided to build the Edwards Ferry Causeway which is now under construction.

The banks on either side of the Roanoke River con-



THE SCREENING AND WASHING PLANT

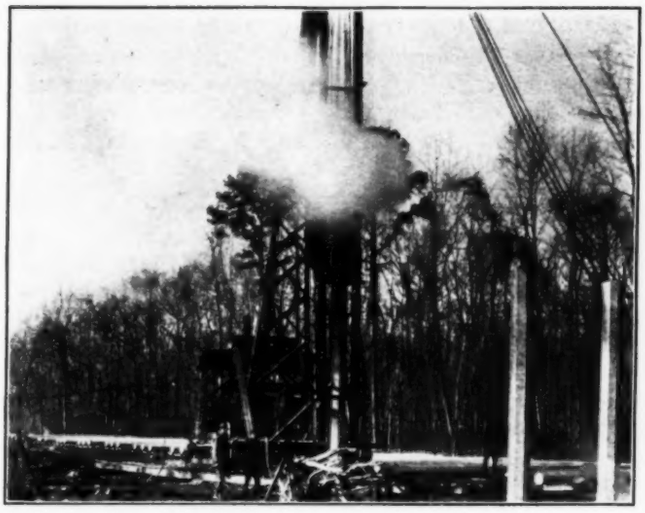
THE PILES IN PLACE



A VIEW OF THE CASTING YARD, SHOWING DETAILS OF CASTING AND PLACING STEEL

sist of a series of secondary banks and lowlands rising higher and higher until the primary banks are reached. The distance between the primary banks is about four miles and during extreme high water the river reaches the entire distance.

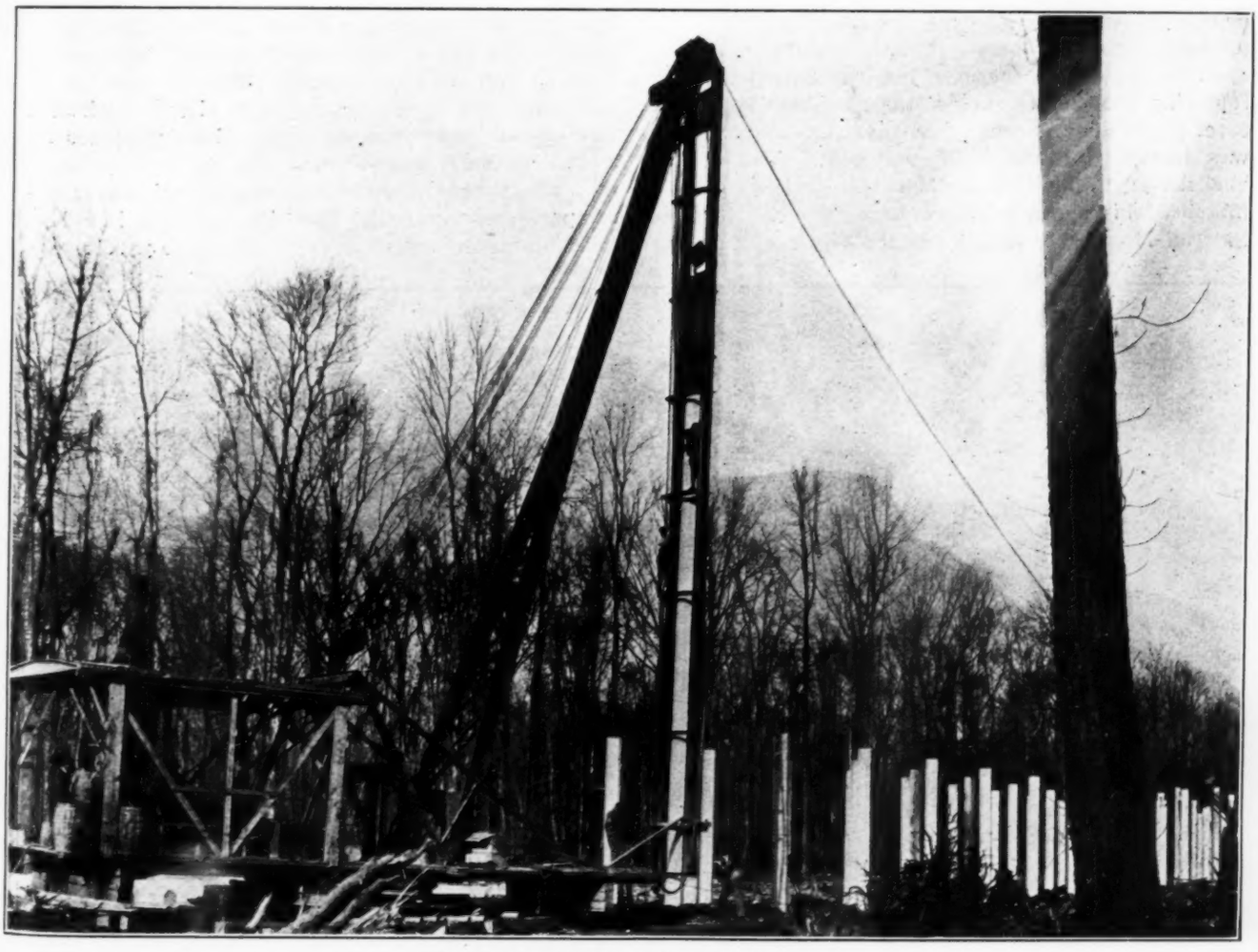
It was decided to span the main channel of the river with one 350-ft. steel truss resting on two precast pile bents each consisting of twenty-seven 60-ft. precast piles.



PILE DRIVER SHOWING TEMPLET FOR HOLDING PILE IN PLACE

At either end of the bridge are reinforced concrete abutments, also supported on piles. The floor of the bridge is to be of creosoted timber, on which will be laid a concrete wearing surface. The approach causeway consists of 268 spans of 20 ft. each. The total length of the bridge is 5710 ft.

The first work was to determine the length of the precast piles. This was accomplished by making wooden test piles the shape and size of the precast piles and driving them along the center line recording the bearing capacity for each foot of depth. This information was plotted on profile and lines drawn the required bearing capacity. A gravel bed was found about 1 mile from the south end of the project and a screening and washing plant was installed. Both sand and gravel are obtained from the pit. Thus a long haul and costly freight charges were eliminated. The piles are cast in close proximity to where they are to be driven. A center line of three rows of piles is established with transit and templet set over the exact position of the piles and fastened down so that there can be no movement. The piles are then kept perpendicular with two transits during driving. If the pile gets out of plumb, the head is shifted in the right direction. No trouble has been experienced in getting the proper bearing capacity, but some of



ANOTHER VIEW OF THE PILE DRIVER

the piles have been driven to refusal and did not reach the grade line. The exact grade line of the top is held by the use of the wye level.

An interesting feature in connection with the work is that all the material with the exception of the steel and cement is obtained locally. When completed the work will cost approximately $350,000. J. B. Cutchin is concrete inspector on the job, G. D. Woodley is instrument man, William I. Morton is steel inspector, and W. B. Benthol is soil inspector.

BUCKET LOADERS REPLACE SHOVELERS

TWO bucket loaders with one operator each are replacing 17 men on a road job at St. Charles, Ill., according to Hans Jensen, the contractor. The photograph accompanying this article gives a general idea of how Mr. Jensen is using these loaders at his central mixing plant. The layout has proved so successful that he intends to use the same set-up for a street paving job which he is going to do in St. Charles.

During the winter enough sand and gravel were stored in advance to complete one mile of road. As the material is loaded by the bucket loaders it is replenished by trucks from an adjacent pit located near St. Charles. This set-up eliminates the need for a pipe line on the country road job and will enable Mr. Jensen to proceed with his city paving work when the country job is completed.

When Mr. Jensen first started to do city paving he had a small mixer. Later on he purchased a large mixer, but found that because he was using the shovel method of loading the trucks, the large mixer did not produce any more concrete than the small one. Thereupon he decided to increase his loading capacity by replacing his shovel gang with a bucket loader. A careful check on results showed that his capacity was increased at least 25 per cent. The second bucket loader which he procured this year has greatly increased his speed over previous figures. He finds that on Monday mornings particularly the machines are proportionately more efficient. Under the old system, Monday morning almost invariably found him under-manned. The machines eliminated this difficulty, being on the job on Monday the same as on any other day.

Both of the loaders are veterans at loading work. Mr. Jensen used one of them for moving stone for street paving work last year. The one which he is using to load sand on his present job was purchased by him this year, but had been in use at various pits throughout the country since 1919.

On other jobs, where central mixing plants are not permitted by the specifications or are not feasible, road builders are finding it advantageous to use bucket loaders in central storage and dry batching plants. This arrangement gives the contractor practically unlimited storage capacity for his aggregates and a most flexible loading equipment. Whether single or multiple batch trucks are used, bucket loaders, equipped with measuring hoppers, reduce the so often troublesome and costly "human element" to the minimum, deliver the stipulated quantities of stone, gravel and sand, and keep the trucks moving on schedule. The use of bucket loaders where the aggregates are stored on the subgrade near the paver is probably too well known to require any comments, but it is only comparatively recently that this system has been taken up to any extent in central storage yards.

GENERAL VIEW OF JOB SHOWING BUCKET LOADERS AT WORK

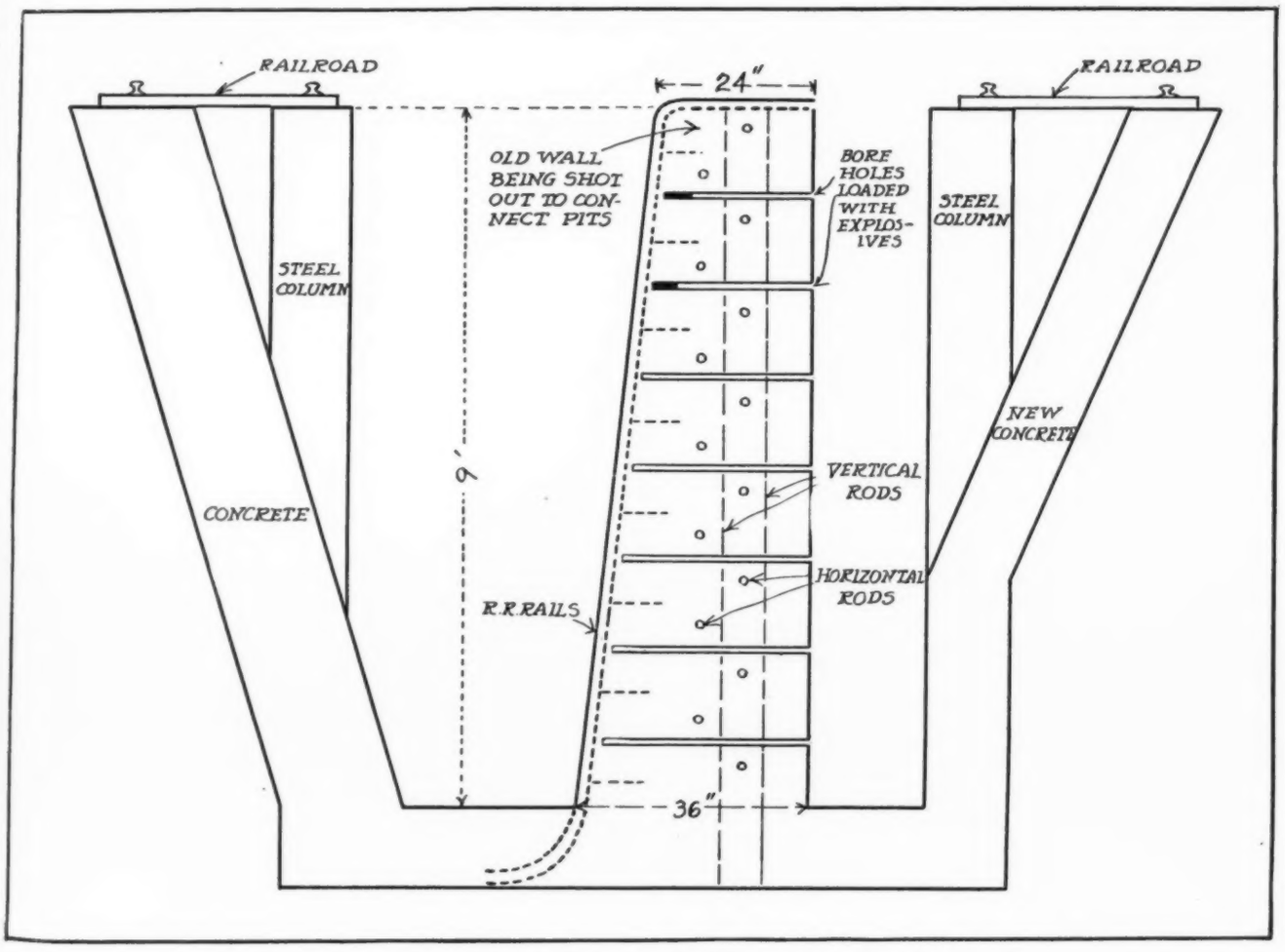
DYNAMITE REMOVES CONCRETE WALL BETWEEN CINDER PITS IN RAILROAD YARD

BLASTING with dynamite to break up old concrete foundations or walls which need to be removed is coming to be common practice. Recently when the Illinois Central Railroad wished to tear down the concrete walls between some cinder pits in order to convert two single pits into one double pit with a dumping track on both sides, it employed the dynamite method. Paul R. Higgins, a practical blaster of Fort Dodge, Iowa, did the work.

The accompanying sketch shows the concrete wall which was broken up. It was 9 ft. high, 24 in. thick at the top and 36 in. thick at the bottom, and was reinforced with 7/8-in. rods running both vertically and horizontally at distances of 7 in. apart. Along the sloping face of the wall, with their base embedded in the concrete and anchored with tie bolts, were railroad rails 18 in. apart.

Tearing down this solid mass of concrete and steel with pick and sledge would have been very slow, laborious and costly, but dynamite made it relatively easy and cheap. Holes were drilled into the concrete from the vertical side, in a line with each rail and from 14 to 16 in. apart in the other direction. Working from the top down, two horizontal rows of holes at a time were loaded with dynamite and fired. One-third of a cartridge of 40 per cent ammonia dynamite and an electric blasting cap were used in each hole. These small charges tended simply to crack the concrete and loosen it from the reinforcing rods so that it could be removed piece by piece, but to guard against danger from possible flying fragments the work was covered with heavy planks. While the shooting had to be done between movements of engines over the adjoining tracks, the work of the men in the oil house 16 ft. away was uninterrupted by the blasts.

Two walls like the one shown, containing together about 120 cu. yd. of concrete, were blasted out, making four single cinder pits into two double ones and the Illinois Central officials in charge were so well pleased with the results and the economy of doing this work with dynamite that they plan later to blast out the walls between a number of double pits so as to turn them into one long double pit. The sketch gives a good idea of the way in which an extremely difficult job was done easily and inexpensively.



SKETCH SHOWING OLD WALL AND POSITION OF DYNAMITE CHARGES

CRANE SPEEDS UP BUILDING JOB

THE problems of speeding up material to a concrete mixer and of eliminating the great number of men needed on a building job were successfully solved recently by the Sam W. Emerson Company of Cleveland. This company was building a new plant for Fisher Brothers on Lakeside Avenue in Cleveland and decided to hire a full-circle-swing crane mounted on a motor truck to assist them in handling the material to the mixer. As may be seen in the photograph, the crane was equipped with a clamshell bucket which took the stone from the storage pile at the left and loaded it into a raised measuring hopper which had been placed over the concrete mixer. The mixer was in the basement and the sand was wheeled to it in the usual manner. Congestion was eliminated, however, by replacing the stone wheelbarrow pushers with the crane, which did the work faster than men could do it, and enabled the contractors to avoid the usual delays in keeping the mixer operating. Another advantage in using the truck-mounted crane, which was greatly appreciated by the contractors, was its ability to load in close quarters, to do efficient work without taking up a great deal of room and to move about from place to place easily and quickly.

TO PREVENT DELAYS IN REPAIRING ROADS

UNNECESSARY delays in making repairs on Pennsylvania roads must be prevented by every means in the power of the division and district engineers, according to the instructions sent out by William H. Connell, Engineering Executive of the State Highway Department.

"I am very serious about this," said Mr. Connell, "And I want you to take immediate steps to put on sufficient additional labor to clean up your repair work at once; and, of course, you will keep sufficient labor on this work to insure the roads being kept in smooth condition for travel the balance of the season.

"You will have to do more work in the same period of time than you did last year and in previous years. You cannot complete your early spring repairs in a shorter period of time unless you employ more labor.

"The proposition is very simple; put on more men and clean up the work. The people of Pennsylvania are entitled to travel over a smooth roadbed the entire season."

CONVEYORS HELP SOLVE COAL STORAGE PROBLEM

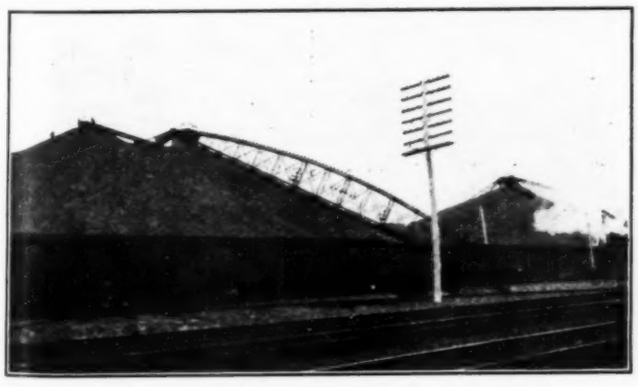
AT Dover, N. J., the D. L. & W. Coal Co. has a very important coal storage plant. Two "trimmers," erected some twenty years ago, are used to unload railroad cars and to deliver the coal onto two storage piles. Each of these trimmers is capable of unloading 100 cars per day and of piling the coal about 80 ft. high. An endless chain, carrying drag scrapers and mounted on a pivoting arm, reclaims the

BEFORE THE CONVEYOR WAS USED

coal when needed for shipment out, and drags it up to a tower from where it is discharged into cars.

For the last several months the company has been stocking steam sizes of anthracite at Dover, and early this summer the piles reached the practical forcing limit of the trimmers. To increase the storage capacity a belt conveyor was installed on top of one pile, so arranged that it would receive the coal from the trimmer and carry it out horizontally.

Setting up a 24-in. belt conveyor of the necessary length on a foundation of fine coal, 80 ft. up in the air, does not appear very feasible at first sight, but the company's operators, being practical men, worked out a solution. The belt conveyor purchased had a sectional steel frame, with a 7½-hp. electric motor



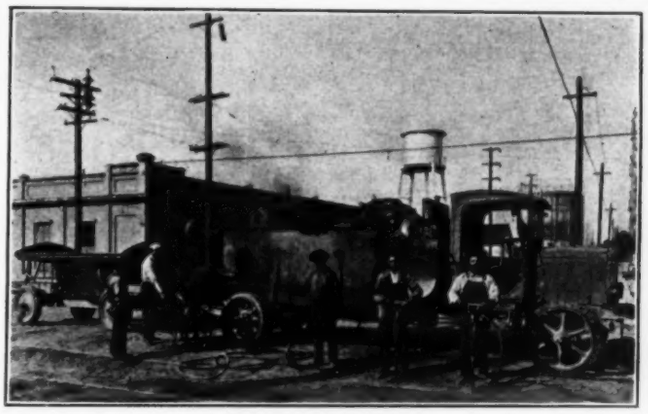
THE CONVEYOR IN PLACE

mounted inside the framework. This was first set up for a length of 30 ft., with the middle point of the conveyor over the center of the pile and under the discharge point of the trimmer. Rollers under the conveyor, resting on heavy planking, allowed the conveyor to be pushed forward as the coal pile was built up under the front end of the conveyor. Then additional intermediate sections were installed in the conveyor until the discharge end was out 75 ft. from the loading point.

One of the accompanying photographs shows the layout at the time the conveyor was first installed. The other photograph was taken after the conveyor had been extended to 60 ft. and had increased the amount of coal in this particular pile by over 20,000 tons. As further storage is desired the belt conveyor can be lengthened to a certain extent and then other conveyor units added ahead of and in series with the present one.

A ROAD-MENDING TRUCK

A TRUCK that is remarkably complete and convenient for road-mending work is now in service for the San Diego Electric Railway Company. This truck carries both machinery and materials. In addition to a rotary concrete mixer, driven by an auxiliary shaft from the transmission, there are combination material bins, with capacities of 1000 lb. of cement, 1 cu. yd. of sand and 2 cu. yd. of gravel or rock. Gravity feed from the bins to the mixing apron is controlled by means of hand-operated gates. Just back of the material bins is located a steel water



READY FOR WORK

tank with a capacity of 150 gal. The other equipment includes a large pneumatic jack hammer, with assorted chisels, tampers, etc., a twin-cylinder air compressor that is operated by a belt from the forward drive shaft and has a capacity of 80 cu. ft. per minute, a large air receiver just back of the cab, and 200 ft. of 1-in. air hose and connections. For filling the water tank a centrifugal pump has been provided that has a self-priming device and a suction hose.

The truck also has a tar or road oil heating tank with a capacity of 50 gal. The materials are heated by a gasoline burner arranged under the tank. For erecting fences along the highways a pneumatic post-hole digger has been included in the equipment. Then, too, there is a drawbar attachment on the rear of the truck for hauling trailers or for operating the grading plow, and a siphon nozzle for spraying hot tar or oil.

The outfit is proving useful in repairing ruptures or breaks in reinforced or plain concrete, macadam or other forms of road construction and is also being used to erect or repair concrete bridges and culverts.

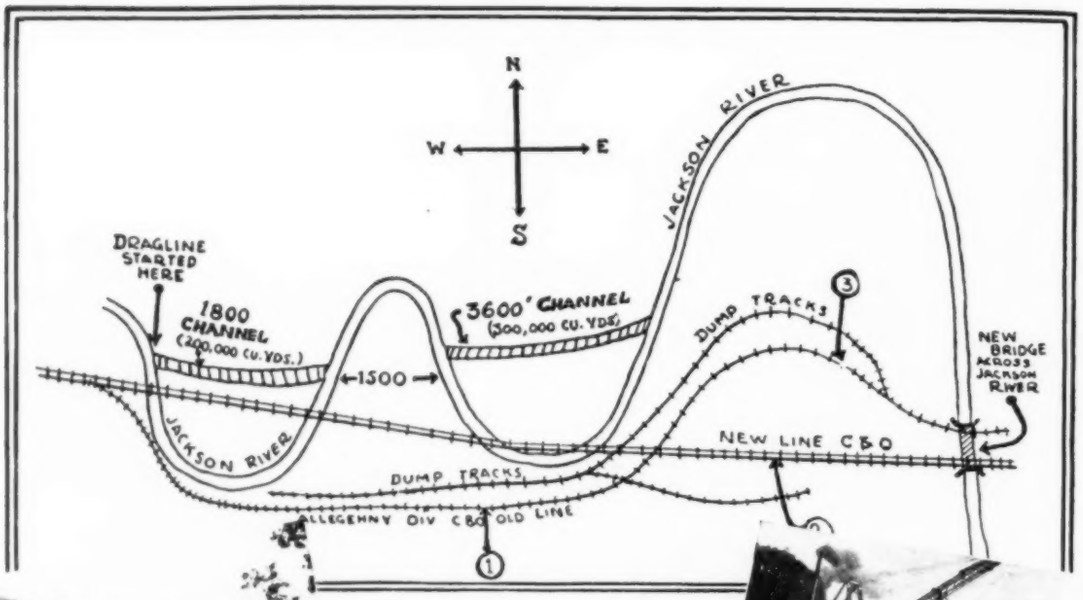


Diagram showing changes under way by Chesapeake & Ohio Railway at Clifton Forge, Va.

Changing a River's Course with du Pont Explosives

NOWADAYS engineers and contractors think nothing of straightening out the kinks in a river's course or removing a hill or two from one part of the landscape to another.

But in an operation of this kind at Clifton Forge, Va., the Brooks-Callaway Company, of Atlanta, is undertaking a real he-man's job for the Chesapeake & Ohio Railway. This job was started in April 1923, and will be completed in April 1925.

The excavation work includes about 2,200,000 cubic yards within less than two miles, a reduction in the curvature of the main line, the cutting of 5,400 feet of river channel and the construction of a 24-track concrete bridge 300 feet long. By this operation the present railroad yards will be increased from 43 to 66 miles of track.

The new Jackson River channel is being made with a dragline—about 500,000 cubic yards of excavation. The rock bottom of the channel is blasted to a depth of 7 or 8 feet, and the channel will have a 100-foot bottom and a 1 to 1 slope. W. W. Boxley & Company, of Roanoke, Va., sub-contracted the 30,000 cubic yards of concrete work for the Jackson River bridge.

Du Pont explosives and blasting accessories are being used exclusively, as in hundreds of other important operations throughout the country.

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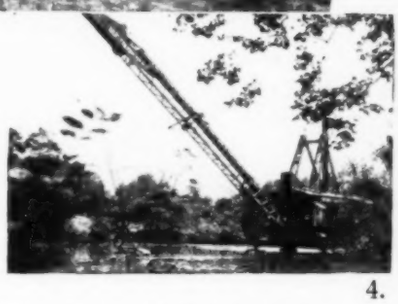

4.

1. *Dump in Jackson River to make bed for new main line. See Point One in Diagram.*

2. *Operation for 300-foot Jackson River bridge.*

3. *Dragline in operation.*

4. *Dragline mounted on trucks crossing Jackson River.*

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